

## Transformation of heavy petroleum during chemical and biological degradation in soil

Kayukova G., Egorova K., Gabitova R., Zaripova S., Naumova R., Romanov G.  
*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

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### Abstract

Trends in the constitutional changes of the Lebyazhinskoe-field heavy oil after chemical oxidation and its 6-month biodegradation in soil were studied. It was shown that quantitative changes in the composition of high-molecular-weight biomarkers take place, together with the degradation of normal and isoprenoid alkanes, during the transformation of an A2 type labile oil into a solid product that is similar to a type B1 natural asphaltite. These changes represent a decrease in proportion of epimers having the biological configuration of 20-R methyl in the aliphatic molecular chain and the selective degradation of the steroid ring of cholestane C27 epimers, resulting in their almost complete disappearance in the petroleum degradation products. A comparatively higher stability of the high-molecular-weight C28 and C29 homologues of cholestane and C29-C33 hopanes in bacterial degradation processes allows these biomarkers, in particular, the adiantane/hopane ratio, to be used for identifying the presence of petroleum hydrocarbons in soil and determining the genotype of soil-polluting petroleum.

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